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Lars Svensson

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Technology, institutions and allocation of time in Swedish households 1920-1990[♦]

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Abstract

The modernisation of Swedish households during the twentieth century prompted a considerable productivity growth in household production, which reduced the time input for a fixed volume of routine household work by about 35 per cent 1920-1990. Much of that time was gradually transferred to the labour market, but no evidence can be found for an increase in leisure time. What has been termed a "Cowan paradox" appears in the Swedish data: the output of household services increased significantly with productivity-enhancing technical change. This was, however, the case only in households where small children constituted an impediment to labour market entry. Increased returns to market work induced women who did not face this restriction to allocate more time to the labour market from the mid-1940s. A set of new formal and informal institutions associated with the family eventually redefined the concept of "small children" and so shifted the position of homemaker from being a more or less permanent status of some women to a clearly temporary position of most women.

Keywords: Time allocation, Labour supply, Household technologies, Family policy
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1 Introduction

Technical change has revolutionised household work. The modernisation of homes and introduction of household appliances have been prominent features of the rise in living standards in many countries since the mid-nineteenth century. One aspect of this development is the rise in productivity of homemaking, which has enabled both a reduction of the amount of time used for household work, an increase in the volume of household services and reallocation of the time spent on different activities.

A number of studies from different countries have demonstrated that there is no straightforward time-reducing effect on household work from the introduction of household appliances. Vanek (1974) found that American housewives rather increased than decreased the time they devoted to household production as new and more efficient technologies were introduced. In a book with the suggestive title "More Work for Mothers" (1983) Ruth Cowan-Schwartz came to a similar conclusion. The results have been referred to as "the Cowan Paradox" (Mokyr 2000).

Other authors have been more hesitant to draw conclusions as strong as Vanek and Cowan-Schwartz but have pointed in the same direction. In a broad international comparative time-budget study on data collected for twelve countries during the latter half of the 1960s Szalai and collaborators came to the following conclusion: "There is little sign, however, that gains from an abundant labour-saving technology receive much translation into leisure. Variations in time devoted to household obligations across our sites are not spectacularly large … " (Szalai (ed.) 1972:125).

In the Swedish case the long term development obviously brought a reallocation of time from households to the labour market. In fact households reduced the time for household work by more than a half during the twentieth century. The same period saw a tremendous increase in labour force participation of married women and mothers. The short-term patterns and the immediate association between the two processes are less clear.

Still, there are clear indications of a Swedish variant of the Cowan paradox. (Boalt 1983:60). The time used for household work by homemakers was not significantly

reduced until the 1970s, while gainfully employed[1] women exploited the timesaving potential of the progress in household technologies at least from the 1950s (Boalt 1983:51; Nyberg 1989: 238)

The aim of this paper is to contribute to this discussion by exploring the connections between the modernisation of Swedish households and the allocation of married women's time. Shifts in time allocation are analysed within a Becker-Gronau framework (Becker 1965; Gronau 1977). In a Becker-Gronau model the time of a household is allocated to three activities – home production, market work and leisure – so that the marginal utilities are equal in equilibrium. It is usually assumed that there are no barriers to flows of time between activities, i.e. these areas of activity are perfectly integrated. In an historical analysis it is more realistic to assume limited integration and that the degree of integration changes over time. To the same effect as removal of barriers to trade prompts integration of commodity and factor markets, changes in institutions associated with the family may remove restrictions on the flows of time within households. Such changes impact the value of time. According to the Heckscher-Ohlin theorem, restrictions on factor flows determine the relative value of a factor, in this case time and thereby the amount of this factor that will be allocated to different activities in equilibrium.

The second section of the paper investigates and presents estimates of the magnitude and time pattern of timesaving effects of the modernisation of Swedish households 1920-1990. These are measured as the annual change in time required for a fixed volume of household services.

Section III explores the evolution of married women's gainful employment during the same period. The structure and time pattern of labour force participation are analysed in connection with shifts in family-related institutions. The effect of increased productivity in household work on time allocation seems to have been filtered through institutional arrangements associated with family and children that affected the time

[1] "Gainfully employed" corresponds to "yrkesverksam", the term used for being employed in the Swedish Population and Housing censuses, where it is loosely defined as "employed the greater part of normal hours of work" (cf Silenstam 1970:20-21).

pattern as well as magnitude of change and largely determining who stayed in the home and who entered the labour market.

Section IV contains an attempt to fit the results of the previous analysis – among them indications of a Cowan paradox – into a Becker-Gronau model of time allocation. The proximate result is that these do not fit into a model with stable utility relations. The proposed solution considers – similar to what Mokyr (2000) suggested – an exogenous positive shift in the perceived utility of household work.

The period is 1920-1990, and the starting point is determined by data access. Information on diffusion of household technologies is available from 1923 but has been extrapolated back to 1920 in order to match census data on labour market status. Except for the last period, 1965-1990, the study concerns urban households only. There are two reasons for this, one theoretical and one practical. First, the framework used for the time allocation analysis does not apply well to households in the agricultural sector. Second, some of the data sources for household technologies cover urban conditions only, although the definition of urban is not explicit. Moreover, until the introduction of modern labour force surveys in the mid-1960s data on female employment exclude the agricultural sector (see Silenstam 1970:20). In practice, these differences between periods probably do not significantly affect the results, since the agricultural sector employed less than ten per cent of the labour force in 1965 and four per cent in 1990.

2 Productivity growth and potential timesavings

The estimates of potential timesavings from the introduction of new household technologies are based on two types of data. One is information about the proportion of households with access to certain technologies at different points of time, which is available in a number of surveys on living conditions, the first dating from 1923. The other type of data is information about the timesaving properties of these technologies, which is rarely directly available. Hence calculations have to be based on a combination of scattered information from reports of various kinds and some reasonable assumptions.

The potential timesavings are calculated as the average amount of time that would have been saved if all the efficiency gains from introducing new technologies in the household had been used to reduce the input of time, keeping the output of goods and services constant. The following technologies are included in the estimates[2]:

- Piped water and sewers
- Modern kitchen ranges (gas and electric)
- Central heating
- Vacuum cleaner
- Washing machine
- Dish washer
- Refrigerator
- Freezer

2.1 Diffusion of household technologies

Table 1 reports the proportion of urban households with access to the various household technologies included in the analysis 1923-1990. It reveals a process of gradual modernization of the housing standard in Sweden, which had already started before the

[2] This study only concerns the effects of timesaving technologies, which means that e. g. the sewing machine is not included. Some technologies were not timesaving in the sense the concept is used here – rather the opposite. Home-made clothing was not a substitute for more labour-intensive production in the household, but rather for industrially manufactured clothing purchased in the market. Bowen and Offer (1994) include timesaving as well as time-using

Great War. More than two thirds of urban households were already equipped with piped water and sewers as far back as the early 1920s. Gas or electric kitchen ranges as well as central heating were introduced a little later.

Table 1 Proportion of Swedish households with access to various household technologies, 1923-1990

	Water and sewage	Range (el or gas)	Central heating	Vacuum cleaner	Washing machine	Dish-washer	Refrigerator	Freezer
1923	71	40	3	(5)	-	-	-	-
1933	79	49	36	15	-	-	-	-
1941	-	-	50	34	-	-	(3)	-
1945	84	55	59	-	-	-	-	-
1948	88	60	67	55	1	-	19	-
1952	99	79	70	61	8	-	27	-
1958	100	83	75	74	13	-	53	5
1971	100	92	78	89	38	5	92	45
1975	100	100	87	100	65	18	100	77
1980	100	100	100	100	69	30	100	86
1985	100	100	100	100	73	37	100	91
1990	100	100	100	100	75	44	100	96

Sources: The Swedish Social Welfare Board, Cost of living surveys (1929, 1938, 1943, 1953, 1956, 1961); Statistics Sweden, Living conditions (1975, 1985, 1993)

Electricity was already available to practically all urban households in the early 1920s as 98 per cent used electric lighting in 1923 (Socialstyrelsen 1929: Table S, p. 53). Electrical household appliances, except for the vacuum cleaner, were not widely diffused before World War II. The refrigerator and the electrical washing machine slowly entered Swedish homes after the Second World War but were still absent in the majority of households in the early 1970s. The rapid diffusion of washing machines and dishwashers during the 1970s and 1980s can be explained by a conjuncture of factors: improvement of the technology coincided with a fall in relative prices and a rise in real income. The price of a standard washing machine increased by a factor of 3.4 from 1970 to 1990, while the consumer price index increased fivefold during the same period (Statistical Reports P 1970-1990). *Table 1* demonstrates a broad and continuous introduction of new household technologies over the entire period of our study. The timesaving effect of this development is determined by the timesaving properties of each specific technology.

durables in their study, which, however, addresses a slightly different question than the one treated here: how time at the disposal of households was used.

2.2 Timesaving properties of household technologies

A detailed time study from 1937, covering small farm households that lacked *piped water and sewers,* reported that women under these circumstances used on average 14 minutes per day to bring in water and get rid of sewage (SOU 1939:6, Table 4). It is reasonable to assume that these tasks were more time-consuming to execute in urban households, where more stairs often had to be mounted and descended than on a small farm. In addition, access to piped water, i. e. sufficiently large quantities of water, positively affected the efficiency of other types of routine household work such as cleaning and dishwashing. A reasonable estimate of time reduction as an effect of access to piped water and sewers is 25 minutes per day, which means 175 minutes per week.

As *gas stoves and electrical ranges* replaced wood stoves the laborious task of preparing wood for cooking purposes was eliminated. Again, information about the amount of time used for these tasks can be extracted from the above mentioned time study on small farms. Women in these households used fourteen minutes per day for lighting and keeping fire in the stoves for cooking purposes (SOU 1939:6, Table B). I assume that preparing and bringing in wood for the stove demanded as much time as dealing with water and slops, that is roughly a quarter of an hour per day. This adds up to a total of 200 minutes per week.

The timesaving properties of *central heating and piped hot water* were similar to those of modern ranges. It is reasonable, however, to calculate a scale effect in the handling of wood for double purposes. Households that were equipped with a wood stove and lacked central heating could probably save time by combining tasks for cooking and heating. If handling and bringing in wood for these two separately required fourteen minutes per day, the combined activity may have been carried out in three quarters of that time. This implies that introducing the first of these two conveniences saved seven minutes and the second fourteen minutes per day. Fourteen minutes per day for lighting and keeping the fires should be added to this.

The introduction of central heating lagged behind the set up of modern ranges. For the sake of simplicity, I therefore assume that the latter were installed in individual households either before or at the same time as the installation of central heating. Consequently, the time reduction for setting up a gas or electric ranger is estimated to be

seven plus fourteen minutes per day or approximately 150 minutes per week, while the installation of central heating saved fourteen plus fourteen minutes per day or approximately 200 minutes per week.

According to a survey from the late 1930s, urban homemakers used fourteen hours per week for cleaning the house (SOU 1947:46, Table 2). The lack of direct information means that the effect of the *vacuum cleaner* has to be based on reason. I find it unlikely that a vacuum cleaner increased efficiency in house cleaning by less than 20 per cent, which means a time reduction of 180 minutes per week.

The US Rural Electrification Authority supervised a study in 1945-46 which compared time spent doing laundry by hand with time spent using electrical equipment. It reported that it took about four hours to do a 38 lb load of laundry by hand but only 41 minutes to do the load using an *electrical washing machine* (Greenwood et al. 2005:111). A part, probably the main part, of the time devoted to "pre-modern" washing was used to port water to the stove and heat it by using wood or coal, that is, tasks whose time use in our framework shifts with the installation of piped hot water and modern ranges. Let us assume that 60 per cent of the timesavings were related to these latter tasks and 40 per cent to the washing machine itself. This gives a time reduction of 33 per cent (0.40*(240-41)/240).

Surveys from the 1920s and the 1930s, when electric washing machines were the exception, are surprisingly consistent in their estimates of time use for laundering (Reid 1934: Table VIII, SOU 1947:46, Table 1). About seven hours per week were used for doing the laundry. A potential timesaving of 33 per cent means approximately 140 minutes per week.

The electric washing machine saved both time and effort but still had to be constantly tended; it had to be replenished with water and emptied manually and the laundry had to be put in a separate wringer or spin-dryer. Only with the introduction of the automatic washing machine was the homemaker free to perform tasks outside the home during the time when the washing machine was working. The automatic operation also brought additional potential time reduction, presumably in the order of half the time previously used or 70 minutes per week.

Automatic washing machines were introduced in the 1950s and started to diffuse into Swedish homes and gradually replaced the old models from the early 1960s. I assume a linear process of replacement over a period of 15 years from 1960 until 1975, when average potential timesavings increased from 140 to 210 minutes per week.

The timesaving potential of the *refrigerator* and the *freezer* lies in the possibility to reduce the number of shopping occasions. Åkerman provides a description of shopping habits in the late 1930s, when less than ten per cent of the households were equipped with refrigerators, …… (Åkerman 1941:65). Assume that access to a refrigerator makes it possible to reduce the number of visits to the butcher's, the dairy and the greengrocer's from six to three days a week. A conservative estimate would be a total reduction of 30 per cent of the 5 hours per week that were used for shopping, that is an estimated potential timesaving of 90 minutes per week. Access to a freezer may have had a timesaving potential of another 15 minutes per week.

Dishwashing was a time-consuming activity before the introduction of the electric dish-washer. Surveys from the 1930s through the 1960s report variations between 5 and 8 hours per week. Automatic *dishwashers* that were introduced and diffused only from the early 1980s are very time-efficient. The difference between washing the dishes and just filling and emptying the washer must have brought a substantial reduction of the time used, presumably of at least two thirds. The average time spent on dishwashing before the diffusion of electric dishwashers is estimated to be six hours per week, two thirds of which is 240 minutes per week. The models of the 1970s were less efficient so the time reduction is calculated to only 50 per cent, which is 180 minutes per week. It is assumed that replacement was a linear process over a period of ten years from 1980.

Table 2 Potential timesavings due to shifts in household technology

	Minutes per week
Water and sewers	175
Range (el or gas)	150
Central heating	200
Vacuum cleaner	180
Washing machine	140 (210)
Dish-washer	180 (240)
Refrigerator	90
Freezer	15

Source: See text!

Table 2 lists the timesaving properties of modernisation. Multiplying *Table 1* into *Table 2* gives the average change in the potential time savings that are summarized in *Table 3*. Linear extrapolation has been applied to adjust periods to decennial length.

Table 3 Average potential timesavings in Swedish urban households from modernization of the household and use of technological resources 1920-1990.

	Annual change (minutes per week)	Accumulated change at the end of periods (hours per week)
1920-1930	9.6	1.6
1930-1940	12.0	3.6
1940-1950	15.0	6.1
1950-1960	12.6	8.2
1960-1970	12.0	10.1
1970-1980	17.4	15.1
1980-1990	7.2	14.2

Table 3 demonstrates a more or less linear increase in the timesaving effects of new technologies until the 1970s, which brought an acceleration followed by a deceleration in the 1980s. The amount may not seem impressive at a first glance. The accumulated amount of just above 6 hours per week already in 1950 meant, however, a potential to reduce the time allocated to routine household work by more than 25 per cent and by 50 per cent in the mid-1970s.

2.3 Additional factors that affect potential timesaving

There were aseveral additional technical, economic and social conditions whose shifts may have affected the time allocation decisions, both directly and indirectly via the market for goods and services that were substitutes for household production.

Changes in the size and quality of dwellings may have influenced the amount of time required for a fixed standard of cleaning. The average size, measured as average number of rooms per dwelling, did not change significantly before the Second World War. The proportion of dwellings with more than one room was reported constant at about fifty per cent in the housing censuses of 1914, 1933, and 1939. Since 1945 there has been a more or less linear increase in dwelling space. The proportion of dwellings of three rooms and more increased from 24 per cent in 1945 to 39 per cent in 1960, 51 per cent in 1970, 59 per cent in 1980, and 64 per cent in 1990 (SOU 1945:63: 70 and 162; Statistical Abstract of Sweden, selected volumes). More easily worked flooring, e. g. linoleum, was introduced as far back as the 1930s, but probably accelerated with incre-

mental product innovations in the field of synthetic materials after the Second World War.

These shifts in dwelling space and quality presumably had diverging effects. More space logically requires more time for cleaning, but to what extent is difficult to determine. Less cramped housing conditions may work in the opposite direction, as do more easily worked construction materials. An educated guess is that the potential timesaving net effect was minor.

Purchases of ready-made clothing increased by 7.5 per cent per year between 1931 and 1950, by four per cent per year between 1951 and 1970 and by 2.5 per cent per year from 1970 to 1985 (Bentzel 1957, *Table C:III*, Dahlman and Klevmarken 1971, *Table B:16*, Statistical Reports N 10 SM 8601, *Table 1:2*). This reflects not only an increase in consumption but also that products purchased in the market replaced home made clothes to some degree.[3] In 1956 homemakers devoted eight hours per week to sewing compared to only two hours for fulltime employed married women. The difference indicates a timesaving potential in the market for ready made clothing. In addition, product innovation in the field of synthetic fibres probably was a substantial source for potential time savings – as a suggestion from around 1970.

Food consumption increased by almost 40 per cent between 1935 and 1950 (Bentzel 1957:8). This was not the result of an increased intake of calories but of a shift in the composition of the food, notably a transferring of consumption to more refined products. It also seems to have involved a transfer of production from households to the market. The volume of flour purchased decreased by 50 per cent between 1931 and 1955, while the volume of bread increased by 100 per cent in the same period (ibid. *Table C:1*). According to a public report from 1946, some fifty per cent of urban households baked their own bread regularly and another forty per cent did so occasionally. Calculations made for the report indicated, however, that returns to baking at home were low (SOU 1947:46:82) - in contrast to most other types of food preparation. The

[3] Strangely enough it seems as if home production was highly competitive in this field during the period when the process substitution seems to have started. In the mid-1940s the hourly "wage" in home production of clothes was between 1 and 1.5 kronor (SOU 1947:46:89). The female blue-collar wage in the clothing industry was 1.26 in 1945 (Lönestatistisk årsbok 1945). This probably changed as female wages increased and prices of ready-made clothing fell.

report concluded that the price of ready-to-eat food was generally far above the cost of a home produced alternative even when labour costs at market wages were included (SOU 1947:46:74).

Production in the canning industry grew from 15.000 tons in 1930 to 35.000 in 1940, 60.000 in 1950 and 100.000 tons in 1960 (Sveriges industriförbund 1961:509). The bulk of this was canned fish, but very few of the products that were available – at least before the Second World War - seem to have been the basis of full meals. According to the report referred to above the products were too expensive to enter the fare of the normal household. The only exception was canned fish-balls (SOU 1947:46:78).

To conclude, at least until after the Second World War Swedish households did not consume any other industrially produced food of any importance but bread; strangely enough since returns to home production of food were so low. In the following years increased availability and subsidising of meals outside the home were probably more important. This did not only reduce the time that had to be devoted to cooking in the household. It was above all compatible with a two-earner family system.

Free lunches were introduced in Swedish schools in the 1940s. The number of pupils who were offered this public sector good increased from 140 000 in the school year 1946/47 to 950 000 (or 90 per cent of all pupils) in 1966/67 (Elg et al. 1987:128). In 1968 400 000 subsidised meals were served in company canteens. In the early 1980s 1.2 million Swedes had access to subsidised lunch in canteens or in ordinary restaurants (ibid.:129).

The potential timesavings of transferring food preparation to the market is difficult to estimate. The effect seems to have been primarily confined to the period from the late 1960s onwards, and consequently served to reinforce the pattern of timesaving reported in *Table 3* as it adds to the relatively large effect in the 1970s.

The reorganisation of retail trade was a characteristic feature of post-World War II modernisation. Supermarkets replaced small scattered shops. The transportation problem was given two different solutions in the context of scattered shops. Either the purchaser, mostly housewives, toured the scattered shops or the shops provided transportation that was carried out mostly by young errand boys. Possibly, the latter solution became less available over time. If so, time used for shopping increased until the estab-

lishment of supermarkets served to reduce the transportation work needed to do a fixed amount of shopping.

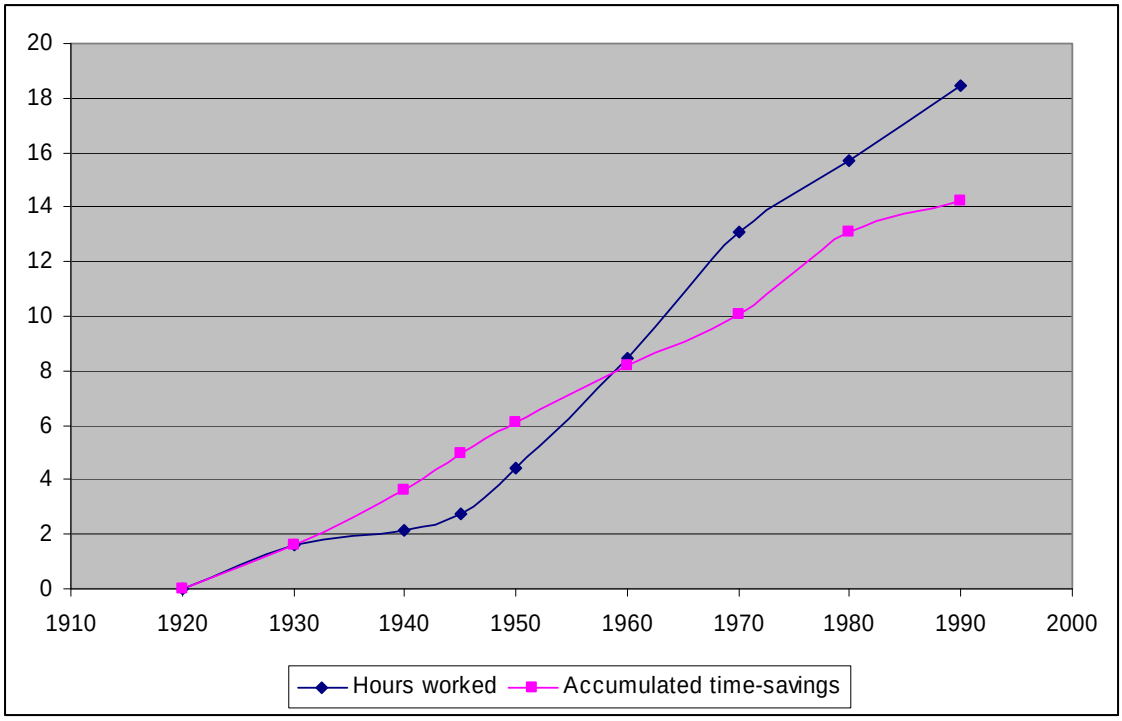
The possibility of realizing this potential was, however, contingent on the availability of transport facilities, notably access to an automobile. A public report from 1975 proposes that shortage of time in combination with access to storage and transportation facilities prompt reduction in the number of shopping occasions. Only 30 per cent of the households in the survey combined these factors. Half of the households with good storage facilities did not have sufficient transportation facilities (SOU 1975:69:139-149). This means that there was a check on the timesaving potential of the refrigerator and the freezer as well as of the re-organization of retail trade, which was only gradually removed. Consequently, the complementary effect of the reorganization of retail trade, diffusion of refrigerators and freezers and of private cars served to accentuate the growth of potential timesavings from the early 1970s.

In sum, a number of shifts, which may be approximately dated and determined with respect to direction change, but for which it is difficult to produce a clear quantitative estimate, seem to have reinforced the acceleration in potential timesavings during the 1970s.

3 The evolution of labour force participation

As stated in the introduction to the paper, the twentieth century was a period of considerable positive shifts in the labour force participation of married women and women with small children. However, the temporal co-variation between female labour force participation and the potential timesavings in homemaking does not appear to be strong (*Figure 1*). This is, of course, no surprise. It only reflects the fact that other determinants of female labour force participation, such as real and relative wages, family policy and institutions and ideological conceptions may have been more important.

Figure 1 Accumulated potential timesavings in Swedish urban households from modernization of the household and use of technological resources 1920-1985 and change in average number of hours worked by married women 1920-1985.



Source: For timesavings, see Tables 1 and 2. For hours worked, see Silenstam 1970 and Statistics Sweden, Labour force surveys 1965-1990.
Note: An average working time of 30 hours per weeks has been assumed for the period 1920-1960.

A feasible interpretation of the processes reflected in *Figure 1* is that increased productivity in household production served to remove an impediment to married women's response to the relative wage increases that signalled positive shifts in demand for female labour. It should not, however, be interpreted as a direct transfer of labour from households to the market as households were modernized. We know that the housing standard and technical equipment were not correlated with labour supply on a household level. Women in households with a higher standard and more appliances were not significantly more gainfully employed than married women on average (Statens institut för konsumentfrågor 1958:60). But who were the women behind the continuous rise in the gainful employment of married women? Did some women transform productivity gains in household work to labour force participation, while others increased the volume of goods and services produced in the household?

These questions will be dealt with as two separate periods, 1945-1965 and 1965-1990. The starting point is when married women's gainful employment starts to increase. The motivation for the break in 1965 is that 1945-65 was a period of institutional stability, while the following period, particularly from the early 1970s, involved important institutional shifts. The choice of 1965 as the break-point is also motivated because the data sources are different for the two periods. The labour force survey data that are available from 1963 admit a more detailed analysis of labour market attachment than the census data that we have to rely on for the previous period.

3.1 Women in the household and in the labour market 1945-1965

Female participation rates did not change much between 1920 and 1945. Although the gainful employment of married women did increase to some extent during the 1920s, it amounted to a mere 10 per cent in 1945.

Table 4 Gainfully employed Swedish women aged 16-64, and blue collar female-to-male wage ratio. Per cent.

	All women	Married women	Female-to-male wage ratio
1920	26.9	3.8	60
1930	30.7	8.0	65
1940	29.3	9.3	64
1945	28.0	10.1	67
1950	29.5	14.1	71
1960	32.0	23.3	70
1965	35.0	29.9	75

Source: Silenstam (1970:105), Svensson (1995)

From the end of World War II increasingly more women, particularly married women, entered the labour market. The increase may not seem impressive on the aggregate level. The two decades between 1945 and 1965 saw an increase in the female participation rate from 28 to 35 per cent, but this was entirely due to a positive shift in the gainful employment of *married* women, who increased their labour force participation threefold from ten to thirty per cent in twenty years. Basically, and on a general level of analysis, the increase in participation rates was driven by a substantial rise in female relative wages in the second half of the 1940s (Svensson 1995:97).

The process exhibited a distinct age pattern. The magnitude of the change increased significantly with age and brought a shift in the age pattern of gainful employment among

married women. *Table 7* shows that the participation rate peaked at the age of 20-24 in 1945, while in 1965 the highest rate was among women 40-49.

Table 5 Age-specific labour force participation rates of married Swedish women 1945-1965.

	15-19	20-24	25-29	30-39	40-49	50-59	60-64	15-64
1945	15.4	17.9	15.2	11.7	10.7	6.6	3.1	10.1
1950	24.7	25.8	20.1	15.1	16.0	11.1	4.8	15.3
1960	25.5	33.8	29.9	27.3	28.1	21.9	9.6	25.6
1965	29.4	37.8	32.4	34.3	39.3	30.5	14.7	29.9

Source: Silenstam (1970:105)

Among married women aged 15-24 the increase in participation rate was considerably larger in 1945-1950 than in the 1950s, indicating an immediate reaction to the relative wage shift in the mid-1940s. For women aged 25 and more the changes were more moderate. Moreover, for this age group the shift was greater after 1950, when relative wages were stationary, than between 1945 and 1950. This is consistent with the conclusions by Svensson (1995:108-111) who found support for the hypothesis that shifts in labour force participation 1945-1960 were connected with shifts in fertility behaviour.

The second half of the 1940s saw a considerable drop in the fertility rate, particularly in the most fertile age groups, which coincided with an upturn in female relative wages (Stanfors 2003:25-26). A feasible interpretation is that relative wages influenced fertility behaviour, which in turn impacted labour force participation. Unfortunately, there is no information on labour force participation of mothers available for this period, but there are empirical as well theoretical arguments that lend indirect support to the interpretation.

The growth in the labour force participation of married women was somewhat stronger in the 1950s than in the period 1945-1950. There seems to have been a delay in the reaction to rising female relative wages, and the presence of small children in the household was probably an important factor behind this frictional resistance.

Results from American studies of female labour supply, which show that the elasticity of supply with respect to the female wage is lower for women 25-34 than for other age groups, lend support to this interpretation. Mincer (1962) concluded, and the argument was repeated by Schultz (1980), that maternal care of small children is more diffi-

cult to find substitutes for than other forms of household work. The presence of small children in the household consequently constitutes the most important impediment to married women's labour market entry (Schultz 1980:80).

In the context of this paper it means that households with small children were obstructed from transforming productivity gains in household production to paid labour. Women with small children tend to stay at home while women who enter the labour market fall into an age-group that to a lesser extent have small children.

3.2 Women in the household and in the labour market 1965-1990[4]

Important institutional changes took place during the 1970s. A tax reform in 1971 introduced separate taxation, thereby increasing the net return of female labour. Soon after public and heavily subsidized day care expanded rapidly (Svensson 1995:57), and successive reforms generated a generous system of parental leave legislation and insurance (Stanfors 2003:App. 2). These changes had a clear positive effect on the female labour supply.

Two processes were at work here. First, these changes in family institutions also brought a shift in the concept of "small children" meaning that the age at which children ceased to be an impediment to market work shifted downwards. Second, the new paternal leave legislation and insurance extended the legal right to parental leave indefinitely. This meant that having children did not imply leaving the labour market and, consequently, the decision to go back to work did not imply a new entry. It is reasonable to believe that this had a profound effect on how the relation between the reproductive and the productive spheres, between family and labour market, was understood. The new regulations supported the view that these were not separate spheres but rather represented different phases to continuously move between during the life cycle.

This is reflected in information on different degrees of labour force attachment. The labour force surveys distinguish between *labour force participation rate* and *at-work rate*. The former is a generous concept, which includes all those who keep or actively

[4] The mid-1960s brought great changes in family life in Sweden. One such change was a sharp decline in the marriage rate. The number of marriages decreased by 40 per cent from the mid-1960s to the late 1970s (Statistical Abstracts of Sweden 1983: 42). It signified a shift from marriage to co-habitation which makes "married women" a

search for a job. The latter is narrower and means to actually be performing a job. Women (and men) on parental leave belong to the labour force but are not regarded as being *at work*. As we shall explore in closer detail later, the difference between the labour force participation rate and at-work rate of women with pre-school children showed a significant increase during the period following the introduction of the new parental leave system. Just as in the previous period, women's response to the demand pull from the labour market was related to the child care issue but with two significant differences. Children who were thought to need a mother's care were, as suggested above, younger and mothers who cared for them did not formally leave the labour market. Most women held the status of homemaker only for short periods and would probably define themselves as having been on leave from their jobs during those periods.

Table 6 At-work-rates of women with youngest child 0-16. Per cent.

	0-3	3-6	7-10	11-16	0-6	0-16
1965	NA	NA	NA	NA	29.5	39.5
1970	30.3	50.1	55.1	61.7	40.4	48.4
1975	36.5	53.1	64.2	68.6	44.4	54.8
1980	40.6	59.3	66.7	70.5	50.1	59.7
1985	41.7	68.3	74.1	77.6	54.9	65.7
1990	41.3	68.0	74.2	77.1	54.0	65.1

Source: Labour Force Surveys 1965-1990

Table 7 Labour force participation rates for Swedish women 16-64, 1965-2000. Per cent.

	All women	Married women	Women with children 0-6
1965	53.8	47.2	36.8
1970	59.3	56.1	49.7
1975	67.9	66.2	60.5
1980	75.2	75.6	75.4
1985	79.2	82.0	84.0
1990	82.3	NA	86.3

Source: Labour Force Surveys 1965-1990

Data on changes in participation rates and at-work rates disaggregated on age of children and mothers support this. The at-work rate of mothers with children 7-17 increased from 50 to 70 per cent between 1965 and 1980. During the same period the at-work-rate of mothers with children 0-6 also increased by 20 percentage points from 30

somewhat obsolete analytical concept. This is why this section makes use of the category "women with children" instead.

to 50 per cent. In 1965 differences with respect to mothers' age were quite small, while in 1980 mothers aged 20-24 exhibited an at-work rate fifteen percentage points below that of mothers aged 35-44 (Labour Force Surveys 1965 and 1980). This was probably because the children of the latter age group tended towards the upper limit of the age span 0-6 and were to a greater extent enrolled in public day care, while children of the former group tended towards the lower limit and were still too young for public day care.

In the same period, 1965 to 1980, the labour force participation of women with children 0-6 increased by almost 40 percentage points, from 37 to 75 per cent, which is a clear indication that these mothers kept their attachment to the labour market.

This was part of a double-sided shift in behaviour. Mothers returned earlier to the labour market and families made increasing use of public day care. Between 1970 and 1985 the enrolment rate in public day care increased from 10 to almost 50 per cent of children age 0-6. Alongside the physical expansion of capacity, a process which might be called an ideological offensive was going on, and its importance, if not its deliberate intention, was to reduce the emotional resistance against leaving children in local authority day care (Svensson 1995:57). Attitudes to this question changed greatly between the 1950s and the early 1980s (Moquist and Kallos 1994:17). This was an informal institutional change that together with the expansion of public day-care and family policy reforms, served to lower the barrier to married women's labour market entry and paved the way for a two-wage-earner system.

4 Time allocation decisions

The cumulative effects of productivity enhancing modernisation in Swedish households had reached a considerable level by the mid-1940s. A fixed volume of household services could then be produced with a time input of six hours less per week than in the 1930s. The next ten years brought a reduction of another two hours, and households were obliged to make decisions about how to allocate this amount of time. The following analysis is an attempt to explain these decisions by comparing predictions derived from a simple model of time allocation with observed patterns of time-use.

The previous section demonstrated that an increasing amount of time was transferred to the labour market after the Second World War as labour demand pushed up female real and relative wages. But it also showed that households differed distinctly in their response to these signals. Women who entered the labour market did not have small children. Women who had small children were not inclined to enter the labour market, and consequently the timesavings from technological change were locked in the household and could only be used to increase household production or leisure. Hence allocation choices have to be analysed separately for these two classes of households.

Models of time allocation, following Becker (1965) and Gronau (1977), usually consider three areas of activity to which households devote their time: paid work, household work and leisure. Decisions are made so that in equilibrium the utility of time allocated to these activities is equal on the margin. However, for reasons pointed out above, households with small children face restrictions to their allocation choice as the labour market and the household are not integrated areas of activity. Consequently, in their case we have to use a restricted variant of the model with only two possible areas of allocation: household production and leisure.

But first we shall consider, within the full model, the allocation choice of women who had the opportunity to enter the labour market in the period running from the end of the Second World War to 1990. The accumulated timesavings were then sufficiently large to serve as an exogenous shock that triggered the reallocation process via shifts of relative utility of time devoted to different purposes. Moreover, an increase in demand for female labour, communicated by positive shifts in female relative wages, served as a shock from the demand side. Under the assumption of decreasing marginal productivity in household production, the model predicts that less time will be allocated to home production. The rise in relative wages prompted an increase in the utility of paid work[5], but here the utility of leisure may be regarded as constant. The result of this admittedly superficial analysis is an expected increase in time devoted to paid market work at the expense of both home production and leisure.

[5] An increase in the wage rate has a positive substitution effect but a negative income effect on labour supply. With regard to the *relative* wage, however, the supply effect is clearly positive as demonstrated in Svensson 1995:15-17.

In the other type of household, where small children served as a barrier to integration with the labour market, optimal Becker-Gronau allocation was excluded since the choice was restricted to household work or leisure. We assume, as in the first case, decreasing marginal productivity in household production. Given that the utility of leisure is constant, the predicted result is a reallocation of time from home production to leisure.

How do these model predictions conform to the actual development of time allocation in the two types of households? Information about time use disaggregated on the labour market status of women is available from the mid-1950s. Although the data are not entirely consistent over time, they allow the sketching of a broad picture of the development.

In 1957 homemakers devoted almost 38 hours per week to cooking, cleaning, dishwashing and laundry. This had been more or less constant from the 1930s in spite of the fact that, according to our estimates, productivity growth in homemaking had brought a potential time reduction of about eight hours per week. Married women who worked full time used slightly more than 23 hours for these activities in 1957, implying that homemakers devoted 65 per cent more time to routine household work than full-timers.

Table 8 Hours per week used by homemakers and full-timers for routine household work (cooking, cleaning, dishwashing and laundry[6]).

	Homemakers	Full-timers
1937	41	NA
1957	38	23
1961	41	NA
1964	42	26.5
1976	32	NA
1982	NA	22.5
1990	23	16.5

Sources: SOU 1947:46; Statens institut för konsumentfrågor (1961); Konsumentverket (1977); Statistics Sweden (1980): Statistics Sweden (1992)

[6] Child care is partly classified as routine household work, (cooking etc.) and partly as leisure.

Table 9 Ratio of time used by homemakers to time used by full-timers for routine household work

	Ratio
1957	1.65
1964	1.59
1976/82	1.42
1990	1.39

Sources: See Table 8!
Note 1: Data for 1976 report only time spent by homemakers and part-timers, while data for 1982 report only time spent by part-timers and full-timers. The data from these two surveys have been combined under the assumption of no change 1976-1982.
Note 2: A survey carried out in 1978-79 (SOU 1979:89:95) reported median values of time spent on routine household work for homemakers to be 59 hours per week and for full-timers to be 39 hours per week, which gives a ratio of 1.51.

Gainfully employed married women reduced the time for household work by 15 hours per week from the 1930s to the mid-1950. Productivity growth led to a reduction of eight hours at fixed output. Average working hours were approximately 30[7]. Thus there must have been a significant reduction in leisure time unless the volume of household service production dropped by half or more, which is unlikely. These findings are consistent with the model analysis above, which predicted a reduction of time devoted to household work as well as to leisure.

In contrast, the data for homemakers do not show any significant reduction of time devoted to household work until some time between the mid-1960s and the mid-1970s. Eventually this group of women also spent less time on routine household work, but change was slow and came late. This is not in line with the predictions of the Becker-Gronau model, i. e. that we should expect the time released by modernisation to be divided between household production and leisure in this type of household. We do not see any increase of leisure for this group. What the data reveal is exactly the type of allocation decision that Mokyr called the Cowan paradox.

4.1 The Cowan paradox revisited

So why did homemakers not increase their time for leisure as productivity in household service production increased? Mokyr has suggested in the American case and for an earlier period that the explanation may be a positive shift in the perceived utility of

[7] The figure for 1963, which is the earliest available, is 31 hours per week for women *at work* i(Labour Force Survey 1963)

household services, notably related to new knowledge and beliefs about the "direct correlation between … variables controlled by homework on the one hand and household health on the other." (Mokyr 2000:35) Is there a similar solution to the paradox in the Swedish case?

I think there is. The large scale transfer of time from unpaid to paid work is an action which both implies and reflects a shift in the appreciation of work, and is partly associated with the symbolic value of money. A raise in pay signals a positive shift in how the work is valued, not only in a materialistic but also in a symbolic sense. In addition, and perhaps more important, money wages have an indirect influence by means of the goods and services that can be obtained. The more it brings in the higher the status that it generates. Thus the increase in compensation for paid work from the mid-1940s prompted a rise in its social status as well. I argue, admittedly a bit speculative, that this positive shift in the attitude to and social status of paid work, spilled over to unpaid work as well. This was partly due to an attempt, which eventually failed, to create a positive shift in the perceived utility of unpaid household work by giving homemaking the status of a profession

The process was probably also impacted by a political and ideological confrontation, which has called "the battle for the women" by historian Yvonne Hirdman (Hirdman 1998:199-237). It started in the 1940s with the motivation to help solve the problem of excess labour demand in Swedish industry, and accelerated in the 1960s. It aimed at influencing both formal and informal institutions. Employers and their organisations took an active part but so did representatives of the state and the trade unions. One successful result was the eventual expansion of public and heavily subsidized childcare. Another was a significant shifting of opinion towards a more positive attitude to childcare in public institutions (Moquist and Kallos 1994). They both served to support the shift of female work from unpaid to paid.

On the resistance side forces gathered in defence of the housewife. The "battle" touched upon many of the debates that were associated with the new institutions that emerged in the area of the family. In an article about the prelude to the tax reform of 1971 that introduced separate taxation of married couples Cristina Florin observed that the resistance to change in the traditional family could be found among women from all

social groups (Florin 1999:108). They linked up with an ideological current that may be traced back to the liberal feminist Elin Wägner, notably to her book Väckarklocka (Alarm clock) from 1941. The strategy of defence comprised an attempt to increase the status of the housewife by professionalizing homemaking. Some support was obtained from the state in the form of Hemmens Forskningsinstitut (HFI), an institute for research in household work, which came into existence in 1944 (Lövgren 1993:123-124). Brita Åkerman, initiator of HFI and a prominent advocate of professionalizing homemaking, was influenced by the rationalisation movement that penetrated Swedish industry. Scientific management thinking was transferred from its industrial context to household production, and the leading Swedish expert on industrial rationalisation, Tarras Sällfors, was recruited to the board of HFI (Lövgren 1993:111). The strategy was obviously to increase the status of homemaking by means of "imitating" paid work.

A positive shift in the status of paid work served inevitably to devalue the relative status of homemaking, which of course posed a problem for women who faced a barrier to labour market entry, and they would consequently be ready to support attempts to reduce the difference in status between the two forms of work. The rationalisation and professionalisation of homemaking served the purpose. In this context education and research were assigned prominent roles.

As would be expected the strategy left no room for an increase of time for leisure, in particular since the importance of household work was reinforced by the strictness of norms. Advertisements in women's magazines as well as commercial films provided guidelines for the use of technology and knowledge in order to increase the standard of homemaking.

Florin remarked that "(t)he transition to a two-earner system demanded a mental adaptation process, notably for a large group of housewives." (Florin 1999:108) The process was part of the battle for female labour, and in this segment fought by women against women. It was not a matter of either class or gender. It was a cause destined to be lost and one which did not receive much support from any powerful groups of women or men (ibid.:108-109). The women whose attempts to exploit the high returns and enjoy the status of paid work were impeded, and so had all the reasons for supporting the cause, belonged to a shrinking group.

The role of housewife gradually disappeared and was replaced by a perception of time for homemaking and childcare as a temporary position. It became recognised as an ideological equivalent of the legally established right to be on parental leave. This rendered superfluous any overproduction of household services, and consequently temporary homemakers reduced the amount of time allocated to household services considerably (*Table 7*).

5 Conclusion

The modernisation of Swedish households prompted a considerable productivity growth in household production during the period 1920-1990. Estimates presented in the paper suggest a minimum potential time reduction for a fixed volume of routine household work of 25 per cent until the mid-1950s and 35 per cent until 1990. Much of that time was gradually transferred to the labour market, but no evidence could be found for an increase in time for leisure. A Cowan paradox appeared as the volume of household services increased significantly – but only in households where small children constituted an impediment to labour market entry. Increased returns to paid work not only prompted women who did not face this restriction to allocate more time to the labour market, but also raised the social status of paid work. In an attempt to match this and increase the status of homemaking, a drive to professionalize and rationalise of homemaking was initiated. This may be interpreted as an endeavour to defend traditional family values. It was supported by a shrinking group of women whose attempts to enter the labour market were impeded, but in the end it was a failure. The emergence of a set of formal and informal institutions associated with the family removed the remaining barriers to gainful employment by means of redefining the concept of “small children”. The ultimate effect was to shift the position of homemaker from being a more or less permanent status of some women to a clearly temporary position of most women.

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